A Critical Review of Pentazocine Abuse

CARL D. CHAMBERS, Ph.D., JAMES A. INCIARDI, M.A., and RICHARD C. STEPHENS, Ph.D.

FOR almost a century, medical science has sought an analgesic with the relative effectiveness of morphine, yet one which would not expose the patient to the possibilities of addiction. The early reports on pentazocine, a benzomorphan analgesic, suggested that such a drug had been developed. Unfortunately, subsequent reports indicated otherwise.

The development of pentazocine can be traced to the early 1950's, when various researchers demonstrated that the morphine antagonist, nalorphine, had analgesic effects in man (*1,2*). Although the use of nalorphine as an analgesic was abandoned almost immediately because of its unpredictable and violent hallucinatory effects on some patients, these early research efforts stimulated the investigation of other antagonists.

Researchers at the Sterling-Winthrop Research Institute, New York, began an intensive study of a family of compounds known as benzomorphans, and by 1961 had synthesized and tested pentazocine (*3,4*). The first empirical evidence of a definite abstinence syndrome in human subjects during a direct addiction study appeared in the literature during 1964 (*5*). The syndrome was, however, labeled as mild. During its 1965 session in Geneva, the World Health Organization's Expert Committee on Dependence-Producing Drugs considered the available evidence and concluded that there was little likelihood of abuse of pentazocine, that pentazocine presented no significant risk to public health, and that there was no need at that time for narcotic control of pentazocine internationally or nationally (*6*). In July 1967, the Food and Drug Administration of the Public Health Service granted permission to Sterling-Winthrop Laboratories of New York to market pentazocine under the trade name of Talwin. Talwin was almost immediately praised in the popular press as a "new painkiller" as effective as morphine, as a drug which did not produce a tolerance requiring ever-increasing amounts, and as a nonaddicting drug that could be safely included in emergency medical kits in such accessible places as fallout shelters and lifeboats without danger of theft by drug addicts (*7–9*). Almost as quickly, reports began to accumulate concerning adverse reactions induced by this drug (*10*).

There is no question as to pentazocine's analgesic properties. Pentazocine apparently has a more rapid onset of analgesic effect than does morphine but with shorter duration (*11*). In tests for dosage effectiveness, the following characteristics have been reported when the drug was administered intramuscularly: a 40-mg. dose of pentazocine has the analgesic effect of 10 mg. of morphine (*12*); when administered orally, three times the intramuscular dose is required to have

Dr. Chambers is director of research and Mr. Inciardi is deputy director of research, New York State Narcotic Addiction Control Commission. Dr. Stephens is staff sociologist of the National Institute of Mental Health Clinical Research Center, Lexington. Tearsheet requests to Dr. Carl D. Chambers, New York State Narcotic Addiction Control Commission, 1855 Broadway, New York, N.Y. 10023.

the same analgesic effect (*13*); and 100 mg. of oral pentazocine has the same analgesic effect as 100 mg. of intramuscular meperidine (*14*). In addition, sufficient data exist to indicate that certain properties of pentazocine make it an analgesic of choice in some situations (*14–16*). Other questions concerning it, however, are not so easily answered.

From the beginning, the professional literature has contained a number of confusing contradictions concerning the abuse potential and adverse reactions to this drug; and the drug companies, clinicians, and researchers have become polarized on several issues. An important polarization is between those who assert the basic nonaddictive nature of the drug (*5,9,17–21*), and those who are equally as convinced of its drawbacks (*22–25*). There are those who insist that hallucinations rarely occur (*26*), and those who present impressive evidence that hallucinations are indeed an adverse reaction to even low doses of pentazocine (*10,27*). There are reports that the drug is free of psychotomimetic reactions (*28*) and others indicating that such reactions do occur (*29*). Those with vested interests have insisted that although there are abusers of injectable pentazocine, there are no abusers of the oral form (tablet) of the drug (*30*). These persons are in conflict with others who have presented case histories of oral abuse and dependence (*31*). And there persists a belief that even though an ever-increasing number of persons are abusing pentazocine and becoming dependent upon it, these persons are somehow addiction-prone people who have misused other drugs (*21,30,32*). Documentation is also available indicating that this is not universally true (*33,34*).

The Physicians' Desk Reference, the most comprehensive information guide on pharmaceutical products for the medical profession, first carried descriptions of Sterling-Winthrop's Talwin in 1968. Under the heading Absence of Addiction Liability, the company advertised the drug as a non-narcotic and not subject to narcotic controls. In the 1969 edition, the heading was changed to Dependence Potential, but the non-narcotic claim was retained. In the 1970 edition, the heading was changed to Drug Dependence, and all non-narcotic claims had disappeared (*35–37*). The contemporary advertisements by Sterling-Winthrop for pentazocine emphasize that the drug is an analgesic which may be effectively used instead of other narcotic analgesics without being subject to narcotic controls. Indicative of the widespread use of the drug, pentazocine was reported in 1970 to be one of the 100 most prescribed drugs in the United States (*38*).

Adding to the confusion and the multiple contradictions in the literature is the statement that most of the items are based upon either a vested interest on the part of the writer or upon limited anecdotal experiences. A recent report of a series of controlled experiments conducted at the National Institute of Mental Health (NIMH) Addiction Research Center in Lexington should provide a significant baseline for comparing all previous and future references to pentazocine (*39*). That series of controlled experiments with human subjects included single-dose studies for subjective effects, precipitation tests, substitution tests, and direct-addiction studies. The results included the following significant items indicative of its abuse potential:

1. Pentazocine in single doses will produce a euphorogenic effect.
2. Pentazocine produces a physical dependence with an abstinence syndrome that is associated with drug-seeking behavior.

Little question exists as to pentazocine's abuse potential or that it produces a true addiction. Two questions do exist, however, concerning the abuse of pentazocine: who are the abusers, and what is the extent of the abuse? In the remainder of this paper, we attempt to clarify o index the answers to these two questions.

Abusers of Pentazocine Only

We have become aware of a number of cases in which pentazocine has been the only drug abused. Such abuse, for the most part, can be attributed to the ready availability of the drug and to the insufficient controls regulating its distribution. The following case history of a pentazocine addict exemplifies this type of abuser.

The 22-year-old white serviceman first encountered pentazocine in 1967 in the Philadelphia Naval Hospital, where he was recovering from a severe leg wound received in Vietnam. This man had received an estimated 50 injections of morphine or meperidine or both per week during the initial 4 months of surgical procedures to repair his leg. The narcotics were abruptly stopped after 4 months, and while he reportedly "wanted a shot" he was in no discernible physical distress.

After being transferred to a ward of less intensive care for recuperation, he was approached

Table 1. Incidence of pentazocine abuse in 3 narcotic addict populations

Group	Number of addicts	Pentazocine abusers					
		Addicted		Use only		Users and addicts	
		Number	Percent	Number	Percent	Number	Percent
Total	1,494	11	0.7	69	4.6	80	5.4
Narcotic Addict Rehabilitation Act national program	1,096	11	1.0	61	5.6	72	6.6
Narcotic Addict Rehabilitation Program, Philadelphia	273	.....		7	2.6	7	2.6
Narcotic Addiction Control Commission, New York State	125	.....		1	.8	1	.8

by hospital corpsmen to purchase a "shot" of pentazocine to reduce any residual pain and to get a "tremendous high," which would "alleviate the boredom of the ward." He rationalized in three ways the illicit purchase and use of the drug: (*a*) the physicians were no longer prescribing medication for him even though his leg still "bothered" him; (*b*) he had not experienced withdrawal distress from the morphine and meperidine, and he knew both to be addicting drugs while he thought the pentazocine was not addicting; and (*c*) most patients sharing his ward were amputees who had been there for extended periods of time, had been using pentazocine for several months, and had reported no ill effects.

With this rationale, the patient began purchasing 1 cc. injections of pentazocine from the corpsmen, who administered the drug intramuscularly. Reportedly, there was no internal control of the drug at this hospital, so the drug was always available for purchase at $5 per 1 cc.

After 4 months of regular abuse of pentazocine, the patient was injecting 1 cc. every 3 or 4 hours during the day, but none during the night. Although he was still paying $5 a day for the increased dosage, the corpsmen were not always available to administer the injections, and they had taught him to prepare for and complete the intramuscular injections into his thighs and arm. At approximately this phase, he was discharged from the hospital for further recuperation at his home in a Philadelphia suburb. At discharge, the corpsmen sold the patient a large number of syringes and vials of injectable pentazocine. In addition, the corpsmen provided him with a number of prescription blanks and taught him how to forge prescriptions for additional pentazocine.

Within 3 months after his discharge from the hospital, the patient had increased his daily dose to 10 cc. in 1 cc. injections. At this level he was no longer receiving any euphoric effects and was taking the drug solely to prevent the onset of withdrawal distress. He was able to obtain the drug from pharmacists who did not question his forged prescriptions. He was even able to find a sympathetic pharmacist in his local community who would refill his prescription 30 to 40 times. In fact, this pharmacist was providing the patient and two other pentazocine addicts with a total of fifty 10-cc. vials of pentazocine every week.

The patient maintained a stabilized dose of 10 cc. per day for approximately 6 months before the pharmacist supplier questioned the legitimacy of continuing to use such high doses. The patient was embarrassed at the confrontation and the implication that he was an addict and decided to reduce his daily dose. During a brief attempt to decrease the dose, he ingested a daily total of 650 mg. of propoxyphene to alleviate any withdrawal distress. After a few days, he reverted to injections of pentazocine at approximately the same dose level of 10 cc. daily. While he would occasionally attempt to replace the injections with comparable oral doses of pentazocine, the oral doses produced too much nausea to continue.

To prevent further embarrassment by approaching the local pharmacist, the patient began shopping for drugs at all pharmacies within a 30- to 40-mile radius of his home. After approximately 3 months of hassling for the drug, he finally admitted to himself that he was an addict and sought admission to a private hospital specializing in the therapeutic community approach to the treatment of alcoholism and all drug addictions.

Table 2. Sex and race distribution of 11 pentazocine addicts at Lexington

Race and sex cohort	Number	Percent
Total	11	100.0
White males	7	63.6
White females	3	27.3
Black males	1	9.1
Black females	0	—

Table 3. Basic demographic characteristics of 11 pentazocine addicts at Lexington

Race and sex	Age (years)	Residence	Marital status	Education (grade)	Any illegal activity	Arrest history
White male	19	Miami, Fla	Single	12	Yes	Yes
Black male	21	Knoxville, Tenn	Married[1]	10	Yes	Yes
White male	25	Norfolk, Va	Married[2]	14	Yes	Yes
White male	27	Baltimore, Md	Separated[1]	8	Yes	No data
White female	29	Louisville, Ky	Single	15	No	No
White male	29	St. Petersburg, Fla	Single	8	Yes	Yes
White female	35	Richardson, Tex	Married[1]	10	Yes	Yes
White male	37	Baltimore, Md	Married[1]	14	No	No
White male	40	Indianapolis, Ind	Married[1]	14	No	No
White male	46	Tuscaloosa, Ala	Married[1]	10	Yes	Yes
White female	56	Tulsa, Okla	Separated[1]	15	No	No

[1] Nonaddicted spouse. [2] Addicted spouse.

The patient was detoxified without the assistance of medication. He reported his withdrawal symptoms as nausea but without vomiting, complete loss of appetite, inability to sleep, constant sweating, and intermittent periods of tenseness, nervousness, depression, and anxiety. After 9 days he illegally obtained a supply of pentazocine from a neighboring pharmacy, which he injected for 3 days until his supply was depleted. He spent the next 4 days attempting to complete detoxification before returning to the same pharmacist in an attempt to obtain a second supply of drugs.

He was arrested during this second attempt. Although he was released on bail, the hospital refused to take him back for treatment. He became readdicted and, accepting the fact that he was an addict, sought treatment at a Veterans Administration Hospital, where he was referred to an outpatient clinic rehabilitating narcotic addicts at the Philadelphia General Hospital. When we last contacted this patient, he had been paying weekly visits to the outpatient clinic for approximately 5 months and was responding very well to a treatment regimen that included long-term ambulatory detoxification with small doses of methadone. This technique had been demonstrated to be effective with abusers of all kinds of narcotics (*40*).

Neither euphorogenic effects nor withdrawal distress were perceptible in this patient when he took the first 20 mg. tablet of methadone twice a day. The patient's daily dose was immediately reduced to a 10 mg. tablet twice a day, and again he did not experience withdrawal symptoms.

Table 4. Patterns of drug abuse of 11

Race and sex	Age (years)	Age at first abuse	First drug of abuse	Medical onset	Years of abuse	Primary drug of abuse and method of use
White male	19	15	Codeine cough syrup	No	4	LSD, oral
Black male	21	13	Methedrine	No	8	Heroin, intramuscular, subcutaneous.
White male	25	16	Marihuana	No	9	Morphine, intravenous
White male	27	13	Marihuana	No	14	Cocaine, intravenous
White female	29	19	Phenmetrazine	Yes	10	Codeine, oral
White male	29	16	Atropine	No	13	Ritalin, intravenous
White female	35	18	Codeine	No	17	Talwin, intramuscular, subcutaneous.
White male	37	22	Propoxyphene	No	15	Seconal, oral
White male	40	32	Codeine	Yes	8	Placidyl, oral
White male	46	34	Meperidine	Yes	12	Dolophine, intramuscular, subcutaneous.
White female	56	50	Chlorpromazine	No	6	Thorazine, oral

[1] Lysergic acid diethylamide.

At the daily dose level of 10 mg. of methadone, the patient reported no drug craving and exhibited no drug-seeking behavior. Attempts to further reduce the daily dose resulted in both reactions. Total abstinence, however, remained the therapeutic objective, and this goal was reinforced by individual psychotherapy and supportive counseling sessions, which his wife also attended.

This patient reported that several wounded veterans in his hospital ward had used pentazocine as much or more than he and that he also knew several pentazocine-only addicts on the streets, but we had no means of ascertaining the prevalence of this type of pentazocine abuse. As demonstrated in this case example, the facts that the drug has a euphorogenic effect, that there exists a mistaken belief that it is nonaddicting, that there is a high degree of accessibility, and that there are inadequate regulatory controls on its distribution are all combining to create a population of addicted persons who will probably become visible in the near future. As such, this type of pentazocine abuse is reminiscent of the patterns of abuse which have also been documented for propoxyphene, glutethimide, and meprobamate (*41–47*).

Abusers of Multiple Drugs

We were able to determine the prevalence of pentazocine abuse in three divergent populations of narcotic addicts. Specific questions regarding any misuse of pentazocine and the extent of misuse were addressed to the following persons:

1. All 1,096 narcotic addicts consecutively admitted during the period May 1967 through July 1969 to the NIMH Clinical Research Center in Lexington as part of the Narcotic Addict Rehabilitation Act (NARA) national program.

2. All 273 narcotic addicts undergoing detoxification or methadone maintenance treatment during December 1969 in the Narcotic Addict Rehabilitation Program (NARP) at the outpatient clinics of Philadelphia General Hospital.

3. All 125 narcotic addicts undergoing treatment during June and July 1970 in two facilities of the New York State Narcotic Addiction Control Commission (NACC).

Narcotic addicts of both sexes were represented in the NARA and the NARP populations, but the NACC population contained only male addicts.

The incidence of pentazocine misuse among these known narcotic abusers was found to be very low (table 1). Only 5.4 percent of the combined addict population had ever abused pentazocine, and less than 1 percent had become addicted as the result of this abuse.

Pentazocine Addicts

Eleven pentazocine abusers reported that they had become physically dependent on the drug. The data did not include the abuse doses that resulted in dependence. Physical dependence was recorded for a patient when he reported experiencing withdrawal distress upon cessation of use. All 11 addicts were in the NARA population at Lexington. Addiction to pentazocine, at least among these multiple drug abu-

pentazocine addicts at Lexington

Drugs other than pentazocine abused											
Opiates (not heroin)	Sedatives or hypnotics	Tranquilizers	Antidepressants	Antihistamines	Heroin	Marihuana	Methedrine	Other stimulants	LSD[1]	Other psychotogens	Glue
Yes.....	Yes....	Yes....	Yes....	No....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes
Yes.....	Yes....	Yes....	No....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes
Yes.....	Yes....	Yes....	Yes....	No....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes
Yes.....	Yes....	Yes....	No....	No....	Yes....	Yes....	Yes....	Yes....	Yes....	Yes....	No
Yes.....	Yes....	No....	No....	No....	No....	No....	No....	Yes....	No....	Yes....	No
Yes.....	Yes....	Yes....	No....	No....	Yes....	Yes....	No....	No....	No....	Yes....	No
Yes.....	Yes....	Yes....	No....	Yes....	No....	No....	No....	No....	No....	Yes....	No
Yes.....	Yes....	Yes....	No....	No....	Yes....	No....	No....	No....	No....	No....	No
Yes.....	Yes....	Yes....	No....	No....	No....	No....	No....	No....	No....	No....	No
Yes.....	Yes....	Yes....	No....	No....	No....	No....	No....	No....	No....	No....	No
Yes.....	Yes....	Yes....	Yes....	No....	No....	No....	No....	No....	No....	No....	No

sers, was overwhelmingly associated with white persons (table 2).

In addition to the predominance of whites among pentazocine addicts, residence in the South, above-average education, above-average age, and intact marriage were outstanding characteristics (table 3). Four addicts denied ever having engaged in any illegal activity, and the lack of arrests tended to substantiate this denial.

The ages of these addicts ranged from 19 to 56 years, with a mean of 33.1 years. Eight of the 11 were or had been married, and only one, a 25-year-old man from Virginia, had a spouse who was also addicted. Formal educations ranged from 8 to 15 years, with a mean of 11.8 years.

As drug abusers, the addicts had been abusing some drug for an average of 10.5 years. The age at onset ranged from 13 to 50 years (table 4), with a mean onset age of 22.5 years (median, 17.0). While a legitimate medical onset was recorded for only three (27.3 percent) of the 11, a legally manufactured and distributed drug was the onset drug for eight (72.7 percent).

All 11 addicts experimented widely in the use of various drugs. Three addicts had abused seven of eight classes of drugs, and all had abused at least three separate classes of drugs. The eight classes of drugs were narcotic analgesics, sedative-hypnotics, relaxants-tranquilizers, stimulants, psychotogens, antidepressants, antihistamines, and inhalants.

Although the 11 pentazocine addicts had extensive careers in experimentation, the primary drug of abuse for eight or 72.7 percent was a legally manufactured drug. Only one addict, a 21-year-old black man, reported heroin as the primary drug of abuse. Six of the 11, however, admitted trying heroin. All 11 had abused the sedative-hypnotics, 10 had abused tranquilizers, eight had abused a psychotogen, four reported the use of LSD, five had smoked marihuana, five had abused some stimulant, three had abused an antidepressant, three had inhaled glue, and two reported that they had abused an antihistamine (table 4).

Both age of the abuser and age at onset of drug use were associated with extent and type of experimentation. The younger the addict at the time of this study and the younger at onset of drug use, the greater was the number of drugs abused and the greater the abuse of the illicit drugs.

Detailed information was obtained about (*a*) the first drug and the first narcotic used, (*b*) the drug and the narcotic most preferred by the pentazocine addicts, and (*c*) the drug and the narcotic most frequently abused.

Pentazocine was not reported

Table 5. Drug histories of 11 pentazocine

Race and sex	Age (years)	Onset drugs		Most preferred drug and method of use		Most frequently
		First drug	First narcotic	Of all drugs	Of the narcotic	Of all drugs
White male.....	19	Codeine cough syrup	Codeine cough syrup	LSD[1], oral.....	Opium, smoked..	LSD[1], oral.....
Black male.....	21	Methedrine.....	Codeine cough syrup	Oxymorphone, intramuscular, subcutaneous.	Oxymorphone, intramuscular, subcutaneous.	Heroin, intramuscular, subcutaneous.
White male.....	25	Marihuana.....	Heroin.....	Morphine, intravenous.	Morphine, intravenous.	Morphine, intravenous.
White male.....	27	Marihuana.....	Codeine cough syrup.	Cocaine, intravenous.	Heroin, intravenous.	Cocaine, intravenous.
White female...	29	Phenmetrazine...	Meperidine.....	Codeine, oral	Codeine, oral....	Codeine, oral.....
White male.....	29	Atropine.....	Codeine.....	Meperidine, oral.	Meperidine, oral.	Methylphenidate, intravenous.
White female...	35	Codeine.....	Codeine.....	Pentazocine,. intramuscular, subcutaneous.	Pentazocine intramuscular, subcutaneous.	Pentazocine, J intramuscular, subcutaneous.
White male.....	37	Propoxyphene....	Propoxyphene....	No data.....	No data.....	Secobarbital, oral.
White male.....	40	Codeine.....	Codeine.....	No data.....	No data.....	Ethchlorvynol, oral
White male.....	46	Meperidine.....	Meperidine.....	Hydromorphone, intramuscular, subcutaneous.	Hydromorphone, intramuscular, subcutaneous.	Methadone, intramuscular, subcutaneous.
White female...	56	Chlorpromazine..	Meperidine.....	Chlorpromazine, oral.	Pentazocine, intramuscular, subcutaneous.	Chlorpromazine, oral.

[1] Lysergic acid diethylamide.

Trade Names of Drugs Mentioned in Tables 4, 5, and 7

Generic name	*Trade name*
Chlorpromazine	Thorazine
Ethchlorvynol	Placidyl
Hydromorphone	Dilaudid
Meperidine	Demerol
Methadone	Dolophine
Methylphenidate	Ritalin
Oxymorphone	Numorphan
Pentazocine	Talwin
Phenmetrazine	Preludin
Propoxyphene	Darvon
Seco barbital	Seconal

by any of the 11 addicts as either the first drug or first narcotic they had abused (table 4). A 56-year-old woman from Oklahoma (table 5) reported injectable pentazocine as the narcotic that she most preferred. A 35-year-old woman from Texas (table 5) reported injectable pentazocine as the narcotic drug and as the non-narcotic drug she most preferred, and as the drug she most frequently abused. This woman was the only pentazocine addict who had never become

addicts at Lexington

abused drugs and method of use	Of the narcotic
.....	Pentazocine, J intramuscular, subcutaneous. Heroin, intramuscular, subcutaneous.
	Morphine, intravenous.
	Heroin, intravenous.
.....	Codeine, oral. Meperidine, oral.
	Pentazocine, J intramuscular, subcutaneous. Meperidine, intramuscular, subcutaneous.
.....	Meperidine, oral. Methadone, intramuscular, subcutaneous. Pentazocine, J intramuscular, subcutaneous.

physically or psychologically dependent on any other drug.

Three of the 11 addicts named injectable pentazocine as the narcotic they most frequently abused. Among the 11 addicts, the incidence of injectable pentazocine as the most frequently abused narcotic equaled that of meperidine and was greater than that reported for any other narcotic. Regardless of which narcotic was abused most frequently, the intravenous technique of injection was the exception among these 11 subjects. Only three patients had histories of administering their drugs intravenously (table 4).

Most of the 11 pentazocine addicts began the use of drugs during or after late adolescence with one of the legally manufactured and distributed drugs. Only two patients had experimented with marihuana as the onset drug (table 4), and only five had ever tried marihuana. None of the 11 began drug use with heroin, although five (40.9 percent) abused a narcotic as their first drug. Two reported heroin as the narcotic they most frequently abused, only one reported heroin as the most frequently abused of any drug, and only six (54.5 percent) reported that they had ever used heroin. In fact, five of the 11 patients had never experimented with marihuana, heroin, methedrine, LSD, or any solvent-inhalant. This, however, was not so with the legal drugs. All had abused the sedative-hypnotics, and 10 (90.9 percent) had abused the tranquilizers.

Abuse Among Narcotic Addicts

The incidence of pentazocine abuse that did not lead to addiction also was ascertained within each study population. There were 69 users of pentazocine among the 1,494 narcotic addicts (4.6 percent) who reported abuse of the drug, but extent and duration were insufficient to become addicted. While the abuse of pentazocine among these patients was incidental to the dominant patterns of abuse, some characteristics of these abusers warranted our attention. For example, pentazocine abuse was not a local problem but occurred in 24 States and the District of Columbia. The abuse of pentazocine was not equally distributed within race and sex cohorts but was more frequently associated with certain cohorts (table 6). We do not assume that the distributions in table 6 are fully representative. All the New York State NACC population, for example, were men.

The study data suggested that white male narcotic abusers, much more frequently than any other race-sex cohort, also had histories of pentazocine abuse. Within the three addict populations studied, white males made up almost half (47.8 percent) of the total pentazocine-abusing population. White persons of both sexes more frequently were abusers of pentazocine than their black counterparts.

Ages of the 69 pentazocine abusers ranged from 18 to 56 years, with a mean of 29.1 years. With reference to drug histories, 39.1 percent began by smoking marihuana, 5.8 percent by sniffing glue, and 2.9 percent by "snorting" heroin. The remaining 52.2 percent began by abusing a drug that was legally manufactured and distributed (table 7).

Analysis of the first narcotics ever abused by these 69 patients suggests a rather unique pattern of onset. For example, 34.8 percent began abusing narcotics with codeine or codeine-base cough

syrups, and only 24.6 percent were initially exposed to narcotics with heroin. The third most frequently used narcotic at onset was propoxyphene. Three patients (4.3 percent) were introduced to narcotics with pentazocine. In all, 75.4 percent of the 69 pentazocine abusers began their careers as narcotic addicts with one of the legally manufactured and distributed drugs. Once initiated, however, heroin became the narcotic most frequently abused by 55.1 percent of them. Frequency of heroin abuse was lower, however, than that which would be expected within this nationwide sample of narcotic addicts (*48*). (Heroin was the most frequently abused drug for 67.1 percent of 2,213 addict-patients admitted to Lexington and Fort Worth during 1965.)

Table 7. Patterns of drug use among 69 narcotic addicts who abused pentazocine without becoming addicted

Drugs	First drug		First narcotic		Most frequent narcotic	
	Number	Percent	Number	Percent	Number	Percent
Total	69	100.0	69	100.0	69	100.0
Narcotic analgesics:						
Heroin	2	2.9	17	24.6	38	55.1
Morphine	3	4.3	4	5.8	5	7.2
Meperidine	5	7.2	6	8.7	10	14.5
Dilaudid			1	1.4	3	4.3
Dihydrocodeinone					1	1.4
Dihydrocodeine	1	1.4	1	1.4		
Codeine[1]	13	18.8	24	34.8	4	5.8
Dolophine					1	1.4
Paregoric	2	2.9	3	4.3	1	1.4
Oxymorphone	1	1.4	2	2.9	3	4.3
Pentazocine			3	4.3	1	1.4
Propoxyphene	3	4.3	8	11.6		
Sedative-hypnotics	2	2.9				
Relaxants-tranquilizers	2	2.9				
Stimulants	4	5.8				
Marihuana	27	39.1				
Psychotogens						
Inhalants	4	5.8				
No data					2	2.9

[1] Codeine category includes cough syrups containing codeine.

Comments and Discussion

The incidence of pentazocine abuse and addiction within the general population is, of course, hidden, but it exists and it probably will increase with the increased legitimate use of the drug for its analgesic properties, and with the recent availability of a preparation of the drug to be administered orally.

Pentazocine abuse and addiction even among persons who are poly-drug abusers have been relatively infrequent. Among pentazocine abusers, however, the addiction potential has been relatively high. Of 80 abusers, 11 (15.7 percent) became addicted.

Table 6. Race-sex distribution of 69 narcotic addicts who also abused pentazocine without becoming addicted

Race-sex cohorts	Number	Percent
Total	69	100.0
White males	33	47.8
White females	14	20.3
Black males	18	26.1
Black females	4	5.8
All white abusers	47	68.1
All black abusers	22	31.9
All male abusers	51	73.9
All female abusers	18	26.1

There are strong indications that the street addict of heroin does not perceive pentazocine as a drug of preference, as a drug to supplement his heroin, or as a drug for temporary maintenance. At least among heroin addicts, the unpredictable hallucinogenic, psychotomimetic, and antagonistic reactions associated with pentazocine undoubtedly detract from this drug's euphorogenic potential. This does not suggest, however, that heroin addicts will not try pentazocine. For example, although our analysis recorded only one pentazocine abuser among the 125 NACC cases, our New York City street investigators detected isolated or sporadic abuse of oral pentazocine. Of six detected concurrent heroin-pentazocine abusers (four Puerto Rican males, one white female, and one white male, all under age 25) only one preferred the effects of the pentazocine.

Lack of interest in pentazocine among heroin addicts does not appear to be shared by the abusers of narcotic "medicine." The essential characteristic of the concurrent nonheroin narcotic-pentazocine abuse is strikingly reminiscent of the dual patterns of narcotic abuse isolated by Ball (*49*), and of the concurrent narcotic-sedative patterns isolated by Chambers (*50*), and Chambers and Moldestad (*51*).

Most available evidence describing the abusers of pentazocine (for example, the specific age-race-sex cohorts most deeply involved, the drug histories of those involved, the techniques of administering drugs, and the geographic distribution of the abusers) suggests that the greatest potential for abuse is within a medical-medicine context. To date we have found only a few instances where pentazocine was

offered for sale on the illicit drug market. Almost all pentazocine being diverted for abuse has been obtained as the result of physician overprescription, pharmacists' overfilling of prescriptions, and inadequate internal control of institutional drug supplies. The professional and lay confusion concerning the addictive properties of this drug and its ready availability have resulted in an increasing incidence of abuse and addiction. It is obvious that the confusion should no longer exist. Sufficient controls would retard this increasing incidence.

REFERENCES

(1) Lasagna, L., and Beecher, H. K.: The analgesic effectiveness of nalorphine and nalorphine-morphine combinations in man. J Pharmacol Exp Ther 112: 356–363 (1954).

(2) Keats, A. S., and Telford, J.: Nalorphine, a potent analgesic in man. J Pharmacol Exp Ther 117: 190–196 (1956).

(3) Archer, S., et al.: Narcotic antagonists as analgesics. Science 137: 541 (1962).

(4) Archer, S., et al.: Pentazocine: Strong analgesics and analgesic antagonists in the benzomorphan series. J Med Chem 7: 123–17 (1964).

(5) Fraser, H. F., and Rosenberg, D. E.: Studies on the human addiction liability of 2-HYDROXY-5, 9-DIMETHYL-2(3,3-DIMETHYLYALLYL)-6, 7-BENZOMORPHAN (WIN 20,228): A weak narcotic antagonist. J Pharmacol Exp Ther 143: 149–156 (1964).

(6) World Health Organization: Expert committee on dependence-producing drugs. Technical Report Series No. 343. Geneva, 1966, p. 6.

(7) Relief without addiction? Time, July 7, 1967, p. 67.

(8) A new painkiller better than morphine. U.S. News and World Report, July 31, 1967, p. 11.

(9) Boehm, G. A. W.: At last—A nonaddicting substitute for morphine? Today's Health, April 1968, pp. 69–72.

(10) DeNosaquo, N.: The hallucinatory effect of pentazocine (Talwin). JAMA 210: 502 (1969).

(11) Bellville, J. W.: Pentazocine—A nonaddicting analgesic. Ann Intern Med 67: 1114–1115 (1967).

(12) Eddy, N. B.: The search for a potent non-addicting analgesic. *In* New concepts in pain and its clinical management, edited by E. S. Way. F. A. Davis Company, Philadelphia, 1967, pp. 65–84.

(13) Drugs and Therapeutic Information, Inc.: Pentazocine (Talwin). Med Letter 11: 41 (1969).

(14) Marks, M. M.: Talwin (pentazocine), a new non-narcotic analgesic in rectal surgery. Int Surg 48: 519–522 (1967).

(15) Duncan, S. L., Ginsburg, J., and Morris, N. F.: Comparison of pentazocine and pethidine in normal labor. Amer J Obstet Gynecol 105: 197–202 (1969).

(16) Scott, M. E., and Orr, R.: Effects of diamorphine, methadone, morphine, and pentazocine in patients with suspected acute myocardial infarction. Lancet No. 7605: 1065–1067, May 31, 1969.

(17) Eddy, N. B.: Pentazocine and its relation to addiction. JAMA 195: 322–323 (1966).

(18) Hinshaw, J. R., et al.: Pentazocine: A potent nonaddicting analgesic. Amer J Med Sci 251: 57–62 (1966).

(19) Kallos, T., and Smith, T. C.: Letter to the editor: Naloxone reversal of pentazocine-induced respiratory depression. JAMA 204: 932 (1968).

(20) Neuschatz, J.: Letter to the editor: Pentazocine; massive dosage without side effects. JAMA 209: 112–113 (1969).

(21) Winthrop Laboratories: Talwin R-brand of pentazocine (as lactate). Product Information Advertisement No. 7026D. New York, September 1969, pp. 1–8.

(22) Keup, W.: Abuse-liability and narcotic antagonism of pentazocine. Dis Nerv Syst 29: 599–602 (1968).

(23) Schoolar, J. C., Idanpaan-Heikkila, P., and Keats, A. S.: Pentazocine addiction? Lancet No. 7608: 1263, June 21, 1969.

(24) Smith, J. W.: Drug abuse with pentazocine. Northwest Medicine, December 1969, p. 1128.

(25) Weber, W. F., and Rome, H. P.: Letter to the editor: Addiction to pentazocine; report of two cases. JAMA 212: 1708 (1970).

(26) Collier, H. O. J., and Schneider, C.: Profiles of activity in rodents of some narcotic and narcotic antagonist drugs. Nature (Lond) 224: 610–612 (1969).

(27) Edison, G. R.: Hallucinations associated with pentazocine. New Eng J Med 281: 447–448 (1969).

(28) Keats, A. S., and Telford, J.: Studies of analgesic drugs. VIII. A narcotic antagonist analgesic without psychotomimetic effects. J Pharmacol Exp Ther 143: 157–164 (1964).

(29) Hamilton, R. C., et al.: Studies of drugs given before anaesthesia. XIII. Pentazocine and other opiate antagonists. Brit J Anaesth 39: 647–656 (1967).

(30) Mungavin, J. M.: Letter to the editor: Pentazocine addiction. Lancet No. 7610: 56–57, July 5, 1969.

(31) Hart, R. H.: Pentazocine addiction. Lancet No. 7622: 690, Sept. 27, 1969.

(32) AMA Council on Drugs: The misuse of pentazocine: Its dependence-producing potential. JAMA 209: 1518–1519 (1969).

(33) Gibson, R. D., and Nebe, F. M.: Physical dependence on pentazocine (Talwin): A case history. Nebraska Med J 54: 689–690 (1969).

(34) Sandoval, R. G., and Wang, R. I. H.: Tolerance and dependence on pentazocine. New Eng J Med 280: 1391–1392 (1969).

(35) Physicians' desk reference, 1968–PDR. Ed. 22. Medical Economics, Oradell, N.J., 1967, pp. 1225–1226.

(36) Physicians' desk reference, 1969–PDR. Ed. 23. Medical Economics, Oradell, N.J., 1969, pp. 1349–1350.
(37) Physicians' desk reference, 1970–PDR. Ed. 24. Medical Economics, Oradell, N.J., 1969, pp. 1480–1482.
(38) Pain drug use may be curbed as addictive. Times-Union, Albany, N.Y., June 18, 1970.
(39) Jasinski, D. R., Martin, W. R., and Hoeldtke, R. D.: Effects of short- and long-term administration of pentazocine in man. Clin Pharmacol Ther 11: 385–403 (1970).
(40) Chambers, C. D.: The detoxification of narcotic addicts in outpatient clinics. *In* Major modalities in the treatment of drug abuse, edited by Brill and Lieberman. Behavior Publications, New York, 1971. In press.
(41) Chambers, C. D., Moffett, A. D., and Cuskey, W. R.: Five patterns of Darvon abuse. Int J Addictions 6: 173–189 (1971).
(42) Chambers, C. D., and Taylor, W. J. R.: Patterns of propoxyphene abuse. Int J Clin Pharmacol Ther Toxicol 4: 240–250 (1971).
(43) Essig, C. F.: Addictive and possible toxic properties of glutethimide. Amer J Psychiat 119: 993 (1963).
(44) Essig, C. F.: Addiction to nonbarbiturate sedative and tranquilizing drugs. Clin Pharmacol Ther 5: 334 (1964).
(45) Essig, C. F.: Newer sedative drugs that can cause states of intoxication and dependence of barbiturate type. JAMA 196: 714–717 (1966).
(46) Moffett, A. D., and Chambers, C. D.: The hidden addiction. Soc Work 15: 54–59 (1970).
(47) Essig, C. F., and Ainslie, J. D.: Addiction to meprobamate. JAMA 164: 1382 (1957).
(48) Ball, J. C., Chambers, C. D., and Ball, M. J.: The association of marihuana smoking with opiate addiction in the United States. J Crim Law Crim Pol Sci 59: 203–211 (1965).
(49) Ball, J. C.: Two patterns of narcotic drug addiction in the United States. J Crim Law Crim Pol Sci 56: 203–211 (1965).
(50) Chambers, C. D.: Barbiturate-sedative abuse: A study of prevalence among narcotic abusers. Int J Addictions 4: 45–57 (1969).
(51) Chambers, C. D., and Moldestad, M.: The evolution of concurrent opiate and sedative addictions. *In* The epidemiology of opiate addiction in the United States, edited by J. C. Ball and C. D. Chambers. Charles C Thomas, Springfield, Ill., 1970.

CHAMBERS, CARL D. (New York State Narcotic Addiction Control Commission), INCIARDI, JAMES A., and STEPHENS, RICHARD C.: *A critical review of pentazocine abuse. HSMHA Health Reports, Vol. 86, July 1971, pp. 627–636.*

The accumulated clinical experience with pentazocine (Talwin) has been reviewed and the abuse potential and addiction liability of the drug has been assessed. The incidence of abuse of pentazocine within the general population remains unknown. Case examples document the abuse of this drug, however, and subsequent addiction to it by persons with no prior history of drug abuse. These persons have been introduced to the euphorogenic effects of pentazocine within legitimate medical-medicine contexts. The involvement of narcotic addicts with pentazocine has been relatively insignificant. The addiction potential among those who reported using pentazocine, however, was fairly high: 11 of 80, or 14 percent of all users of pentazocine, reported that they became addicted to the drug. Extensive analysis of the drug histories of these addicts indicated that they were not typical heroin addicts. They most frequently were whites who abused a variety of "medicines."

In addition to the predominance of whites among the pentazocine addicts, residence in the South, above-average education, above-average age, and intact marriage were outstanding characteristics. Four addicts denied ever having engaged in any illegal activity, and lack of arrests tended to substantiate this denial.

The ages of these addicts ranged from 19 to 56 years, with a mean of 33.1 years. Eight of the 11 were or had been married, and only one, a 25-year-old man, had a spouse who also was addicted. Formal educations ranged from 8 to 15 years, with a mean of 11.8 years.

Ages of the 69 abusers of pentazocine ranged from 18 to 56 years, with a mean of 29.1 years. With reference to drug histories, 39.1 percent began by smoking marihuana, 5.8 percent began by sniffing glue, and 2.9 percent began by "snorting" heroin. The remaining 52.2 percent began by abusing a drug that was legally manufactured and distributed.

Analysis of the first narcotics ever abused by these 69 patients suggests a unique pattern of onset; 34.8 percent began abusing narcotics with codeine or codeine-base cough syrups, and only 24.6 percent were initially exposed to narcotics with heroin. Three patients, or 4.3 percent of the 69, were introduced to narcotics with pentazocine.